Curriculum Vitae

Elvira Rebecca Caldwell
Associate Professor, Department of Computer Science, Winston-Salem State University

Contact Information

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Education

Ph.D. *Curriculum and Instruction - University of North Carolina; Greensboro, NC, 2006*
Dissertation: A Comparative Study of Three Instructional Modalities: Traditional Instruction, Web-Based Instruction, and Online Instruction in Introductory Computer Science Courses
Advisor: Dr. Barbara B. Levin

M.S. *Computer Science - Atlanta (Clark Atlanta) University; Atlanta, GA, 1988*

B.S. *Mathematics - University of North Carolina; Greensboro, 1978*

Professional Experience

Associate Professor, Winston-Salem State University, Winston-Salem, NC
Department of Computer Science 2014-

Assistant Professor, Winston-Salem State University, Winston-Salem, NC
Department of Computer Science 2006-2014

Lecturer, Winston-Salem State University, Winston-Salem, NC
Department of Computer Science 1997-2006

President, The Association of Computer/Information Sciences and Engineering Departments at Minority Institutions (ADMI) 2013- Present

Board Member, The Association of Computer/Information Sciences and Engineering Departments at Minority Institutions (ADMI) 2006-2013

Advisory Board, Center for Teaching Research and Learning (CERTL), Wake Forest University Baptist Medical Center, Winston-Salem, NC

Instructor, Winston-Salem State University, Winston-Salem, NC

- Department of Computer Science 1982 – 1997
- Department of Mathematics 1978 – 1982

Lead Teacher for Computer Literacy (1990-1993), Winston-Salem State University, Winston-Salem, NC

Project Upward Bound, Winston-Salem State University, Winston-Salem, NC

Health Careers Opportunity Program (HCOP), Bowman Gray School of Medicine and Winston-Salem State University

Computer Literacy Workshop, Winston-Salem Forsyth County School System, Winston-Salem, NC

Research Area(s)

- Computer Science Education
- Human Computer Interaction
- Software Engineering

Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

C0-PI, **NC LSAMP, NSF Grant (Active)**
Funding Source: NSF
Funding Program: DUE
Duration : 03/20 – 2/2025

Completed Research Support

Co-PI, **Center for Systems Security and Information Assurance (CSSIA), NSF Grant – DUE** 1465163
Funding Source: NSF
Funding Program: DUE
Duration : 0915/2015 - 08/29/2019

CSSIA has worked with community colleges, educators at all levels, and business leaders across the nation to identify and address obstacles in building successful cybersecurity certificate and degree programs. The center distributes course content to more than 260 institutions and hosts a national faculty development academy that provides workshops to over 500 cybersecurity educators annually. With continued funding as an Advanced Technological Education (ATE) support center, CSSIA will continue to expand the nation's pool of entry-level Information Assurance/Cyber Defense (IA/CD) professionals and to improve curricula and teaching in the field.

Co-PI, Target Infusion Project, NSF Grant – HBCU-UP
Developing Game-Like Instructional Modules to Enhance Student Learning in Lower Level Core Computer Science Courses (exhibit)

Funding Source: NSF – HRD
Funding Program: HBCU-UP
Duration : 09/01/2011 - 08/31/2014

The objective of the proposed targeted infusion project is to develop game-like instructional modules to enhance student learning in lower level core Computer Science (CS) courses, namely Computer Programming I, Computer Programming II and Data Structures. Struggling with these three courses is the main barrier preventing students from declaring the CS major and retaining students in the program. Statistics have shown that fewer African Americans are pursuing Computer Science (CS) degrees relative to their proportion of the overall population and among those who do major in CS very few are employed as programmers. Many minority students have fears of programming, which is one of the major contributing factors for the above troubling situation. Recently, there has been increasing demand for programmers who can develop applications for mobile devices generated by the emerging mobile computing technologies. This is a great opportunity for minority computer scientists to influence the computing industry by developing apps that are targeted to not only African American populations but also the general public. The proposed project will help Winston-Salem State University (WSSU), an HBCU, to enhance CS education, attract new minority and female students to pursue the CS major, and eventually help the enrollment and retention of underrepresented students and increase the pool of qualified minority graduates in this field.

PI, Winston-Salem State University Research Initiative Program Grant, Using Robotics to Improve Student Satisfaction and Engagement in an Introductory Computer Programming Course

Funding Source: Winston-Salem State University Research Initiative Program
Duration: *5/22/2013 – 5/22/2014*
Role: Principal Investigator

The computer science discipline teaches students design, logical reasoning, and problem solving. Most freshmen entering the computer science major have no previous programming experience. Computer programming is seen by a vast majority of students as more difficult and time consuming, and less interesting than other courses of study. Learning to program is a time consuming task, as a very large number of hours must be spent at computer writing and debugging code. Unfortunately, this gives students a sense of information overload as well as a seemingly unstructured set of concepts to link together. Introductory programming classes typically lose more than 5O% of the students that enroll. Robotics is being used as a tool to improve student satisfaction and engagement in Computer Science. Why use robotics? Robotics systems are powerful and affordable. Course modules will be designed using a robotic context to engage students in Computer Programming I. The overall goal of this research project is to improve student comprehension of course content by providing students with a hands-on activity designed to improve student satisfaction and engagement in an introductory programming course.

Co-PI, Advancing Robotics Technology for Societal Impact (ARTSI) Alliance NSF Grant - Broadening Participation in Computing
Funding Source: NSF 1042332
Funding Program: Broadening Participation in Computing
Role: Co-Principal Investigator

The ARTSI (Advancing Robotics Technology for Societal Impact) Alliance is a collaborative education and research project centered around robotics for healthcare, the arts, and entrepreneurship. The goals of ARTSI were to:

- Increase the number of African Americans who study computer science and robotics in college, and encourage them to pursue advanced training in graduate school.
- Increase the number of HBCU faculty who educate students in robotics and involve students in robotics research.
- Recruit K-12 and HBCU students to pursue computer science and robotics education.

Noteworthy Contribution. The chairperson of the Computer Science Department and I developed and implemented the inaugural ARTSI Rising Sophomore Summer Program. This program targeted rising sophomores and was designed to give them the skills they needed to begin doing robotics work, prepare for an upper-level robotics course, and eventually secure an REU position. Students will learn the Linux operating system (shell commands, file system organization, job control, networking, and package management), text editing (Emacs or vi), basic electronics (soldering; use of a multimeter), Lego Mindstorms and iRobot Create programming, and the Tekkotsu platform. Student participation in the program increased their likelihood of participating in subsequent robotics research, taking the robotics course offered each year by the department, and being selected for an REU slot at one of the R1 schools. The results of participation in the Rising Sophomore

North Carolina Space Grant (submitted proposal – March 2007)
Instructional Development Grant
Assisted in writing DOE Grant
Faculty Development Study Grant
NASA Faculty Seed Grant $2000 Science and Mathematics Technology Adventures for Teachers (SAMTAT

Scholastic Contributions

2021 Project Advisor, Tavion Whyte, Masters in Computer Science and Technology, Summer 2021

2019 Project Advisor, Yvetta Glenn, Masters in Computer Science and Technology, May 2019 - The Development of (SASI) Seniors Analysis System Interface: Establishing SeniorsTrust and Increase of Technology Use"

2018 Thesis Advisor, Sharon Wright, Masters in Computer Science and Technology, May, 2018 - "THE IMPACT OF INCORPORATING GENDER SENSITIVE ROBOTIC INSTRUCTIONAL MODULES IN MATHEMATICS"

2014 Thesis Advisor, Crystal Batts, Masters in Computer Science and Technology, May 2014 - "USING ROBOTICS TO ENHANCE ACADEMIC PERFORMANCE AND MOTIVATION IN AN INTRODUCTORY COMPUTER PROGRAMMING COURSE."

2012 Thesis Advisor, Ric'Sheika Branch, Masters in Computer Science and Technology, May 2012 - "KARI - KINECT ASSISTIVE ROBOT AND INNOVATION"

2012 Thesis Committee, Amos Baker, Masters in Computer Science and Technology, May 2012 – "REINFORCING PROGRAMMING CONCEPTS THROUGH GAME LIKE MODULES"

2009 Project Evaluator, Ellen Cunningham, Masters in Computer Science and Technology, December 2009
"REVITALIZING INTEREST IN COMPUTER SCIENCE: A TUTORIAL GUIDE"

Professional Development

- ACM Conference on IT Education (SIGITE'20)
- 2019 Symposium on Computing at Minority Institutions, Memphis, TN
- QEM/ Includes NSF Workshop, March 2019, Baltimore MD
- Robotics System Conference/Workshop, 2018
- NSF JSU Writers Retreat, Summer 2018, 2019
- Computational Science Workshop for Underrepresented Groups (CSWUG) 2007
- ACM SIGCSE 2001, 2002, 2003, 2010
- Supercomputing Conference - SC2002, SC2004, SC2005
- NCSI High Performance Computing Summer Workshops (SC2003, SC2004)
- ADMI Conference 2000, 2003, 2005
- Critical Thinking Workshop 2004
- National Educational Computing Conference
- Wachovia Corporation Summer Faculty Internship
- DoD Summer Fellow, Summer 1993
  - Co-Chair Student Papers/Posters, The 45th ACM Southeast Conference Organizing Committee
  - Conducted seminars on use of Computer Technology in Health Fields – Summer 2004
  - Conducted seminar on Women in Computer Science for GAME Program – Summer 2002
  - Conducted seminar on Using the Computer for Research for Project Upward Bound – Summer 2001
- Presented at the National Science Computational Science Institute Summer 2003 Workshop
- Presented research paper at ADMI Conference 2003
- Submitted White Paper to Central Intelligence Agency (CIA) 1995

Publications

Darina Dicheva, **Rebecca Caldwell**, and Breonte Guy. 2020. Do Badges Increase Student Engagement and Motivation? In Proceedings of ACM Conference on IT Education (SIGITE'20). ACM, New York, NY, USA, 6 pages. https://doi.org/10.1145/3368308.3415393

E. R. Caldwell (2018) "Investigation of Academic Performance, Motivation, and Personality Traits in an Introductory Computer Programming Course", ACM Transactions on Computing Education (TOCE) (submitted)

Judy Qiu, Supun Kamburugamuve, Hyungro Lee, Jerome Mitchell, **Rebecca Caldwell**, Gina Bullock and Linda Hayden. "Teaching, Learning and Collaborating through Cloud Computing Online Classes" EduHPC 2017

J. Zhang, M. Atay, **E. R. Caldwell** and E.J. Jones (2017) "Assessing the Impact of Game-Like Modules in Teaching and Learning", Computer Science Education.

Jinghua Zhang, Emanuel Smith, **Elvira R. Caldwell**, Matthew Perkins (April 2014) Learning and practicing decision structures in a game. Journal of Computing Sciences in Colleges , Volume 29 Issue 4

E. R. Caldwell, E. Jones (December 2013). "Beyond Wrestling: Using Sumobots to Engage Students in the Computer Science Classroom", Journal of Computing Sciences for Colleges.Volume 29 Issue

Zhang, J., Atay, M., **Caldwell, R.,** & Jones, E. J. (2013, March). Developing game-like instructional modules to enhance student learning in lower level core computer science courses. In Proceeding of the 44th ACM technical symposium on Computer science education (pp. 741-741). ACM.

J. Zhang**, E. R. Caldwell,** E. Smith (2013). "Learning the Concept of Java Inheritance in a Game", The 18th IEEE International Conference on Computer Games: AI, Animation, Mobile, Interactive Multimedia, Educational & Serious Games (CGAMES). July 30-Aug.1, 2013, Louisville, Kentucky.

J. Zhang, M. Atay, **R. Caldwell** and E.J. Jones (2013). "Visualizing Loops Using a GameLike Instructional Module", The13th IEEE International Conference on Advanced Learning Technologies, July 15-18, 2013, Beijing, China.

J. Zhang, M. Atay, **R. Caldwell** and E.J. Jones (2013). "Developing GameLike Instructional Modules to Enhance Student Learning in Lower Level Core Computer Science Courses". ACM SIGCSE 2013, March 6-9, 2013, Denver, CO. (poster)

Baker, J. Zhang, **E. R. Caldwell,** *Reinforcing Array and Loop Concepts Through a Game-Like Module*, The17th IEEE International Conference on Computer Games: AI, Animation, Mobile, Interactive Multimedia, Educational & Serious Games (CGAMES), July 30-Aug. 1. Louisville, Kentucky.

J. Zhang, **E. Caldwell**, M. Atay, E.J. Jones, *Learning the Concepts of Classes and Objects in a Game* , bibl. Proceedings of the 2012 International Conference on Frontiers in Education: Computer Science and Computer Engineering (FECS), July 16-19, 2012, Las Vegas, Nevada

Caldwell, E.R., Jones, E. (2012). *Using Robotics to Achieve Meaningful Research Skills In Robotics*. In the proceedings of FLAIRS-25 May 2012 Marco Island, FL .

Caldwell, E.R., Jones, E. (2011). *Using Robotics to Achieve Meaningful Engaged Learning*. Proceedings of the Software, Services, and Semantic Technologies -3 Conference. Springer-Verlag in Advances in Intelligent and Soft Computing Series. Bourgas, Bulgaria.

Boonthum, C., Touretzky,D.,Jones, E., Humphries, T., **Caldwell, R**. (2011). *The ARTSI Alliance: Using Robotics and AI to Recruit African-Americans to Computer Science Research*. In the proceedings of FLAIRS-24 May 2011 - Palm Beach, FL .

Caldwell, ER (2011). Beyond Wrestling: *Using Sumobots in the Computer Science Classroom* at Clemson, University. In the proceedings of ADMI 2011 - The Symposium on Computing at Minority Institutions, Clemson, SC.

Dissertation: A Comparative Study of Three Instructional Modalities: Traditional Instruction, Web-Based Instruction , Online Instruction. (2006)

Duet Programming: Selecting the Dynamic Duo, ADMI Conference Proceedings, Washington, DC 2003

Thesis: *Pascal Programming* (1988)

Professional Affiliations

Association for Computing Machinery
Institute of Electrical and Electronics Engineers Computer Society
Association for Women in Computing
The Association of Computer/Information Sciences and Engineering Departments at Minority Institutions (ADMI) Association for the Advancement of Computing in Education
Zeta Phi Beta Sorority Incorporated

Awards

Trio Achiever Award, North Carolina Council of Educational Opportunity
Nontraditional Adult Student Organization Advocate Award
Wachovia (Wells Fargo) Excellence in Teaching Award
Fellowship to Atlanta (Clark Atlanta) University

Courses Taught

Foundations of Data Analytics
Introduction to Robotics
Computer Programming I – PL1, Pascal, C++, Java
Computer Programming II - PL1, Pascal, C++, Java
Fundamentals of Programming – Java
Introduction to Computer Software Systems – MIPS Assembly Language/Using Robots
Intermediate Programming - Java
Special Topics Level 2, Level 3
Introduction to Computer Technology
Software Development
Directed Study – Senior Thesis